

Technical training.
Product information.
G12 Climate Control



BMW Service

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Technical Training

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General information

Symbols used

The following symbol is used in this document to facilitate better comprehension or to draw attention to very important information:



Contains important safety information and information that needs to be observed strictly in order to guarantee the smooth operation of the system.

Information status and national-market versions

BMW Group vehicles meet the requirements of the highest safety and quality standards. Changes in requirements for environmental protection, customer benefits and design render necessary continuous development of systems and components. Consequently, there may be discrepancies between the contents of this document and the vehicles available in the training course.

This document basically relates to the European version of left hand drive vehicles. Some operating elements or components are arranged differently in right-hand drive vehicles than shown in the graphics in this document. Further differences may arise as the result of the equipment specification in specific markets or countries.

Additional sources of information

Further information on the individual topics can be found in the following:

- Owner's Handbook
- Integrated Service Technical Application.

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The information contained in this document forms an integral part of the technical training of the BMW Group and is intended for the trainer and participants in the seminar. Refer to the latest relevant information systems of the BMW Group for any changes/additions to the technical data.

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G12 Climate Control

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G12 Climate Control

1. Introduction

1.1. In general

The climate control system in the new G12 BMW 7 Series has been updated from previous systems. A newly developed 4 zone heating and air-conditioning unit is used on all G12 models.

A brushless blower motor integrated into the heating and air-conditioning unit provides the supply of fresh air to the vehicle interior via 2 microfilters. The microfilters as well as the blower motor can be accessed from the right footwell.

The IHKA control unit is part of the heating and air-conditioning control panel.



Work on heating and air-conditioning systems must only be performed by competent and qualified personnel. Workshop personnel performing activities in connection with heating and air-conditioning systems in vehicles require a certificate of training.

1.2. Refrigerant

In the US market R134a will still be used. R1234yf will be used in the G12 starting in 03/16 , and in the remaining US vehicles from 07/16.

1.3. Overview

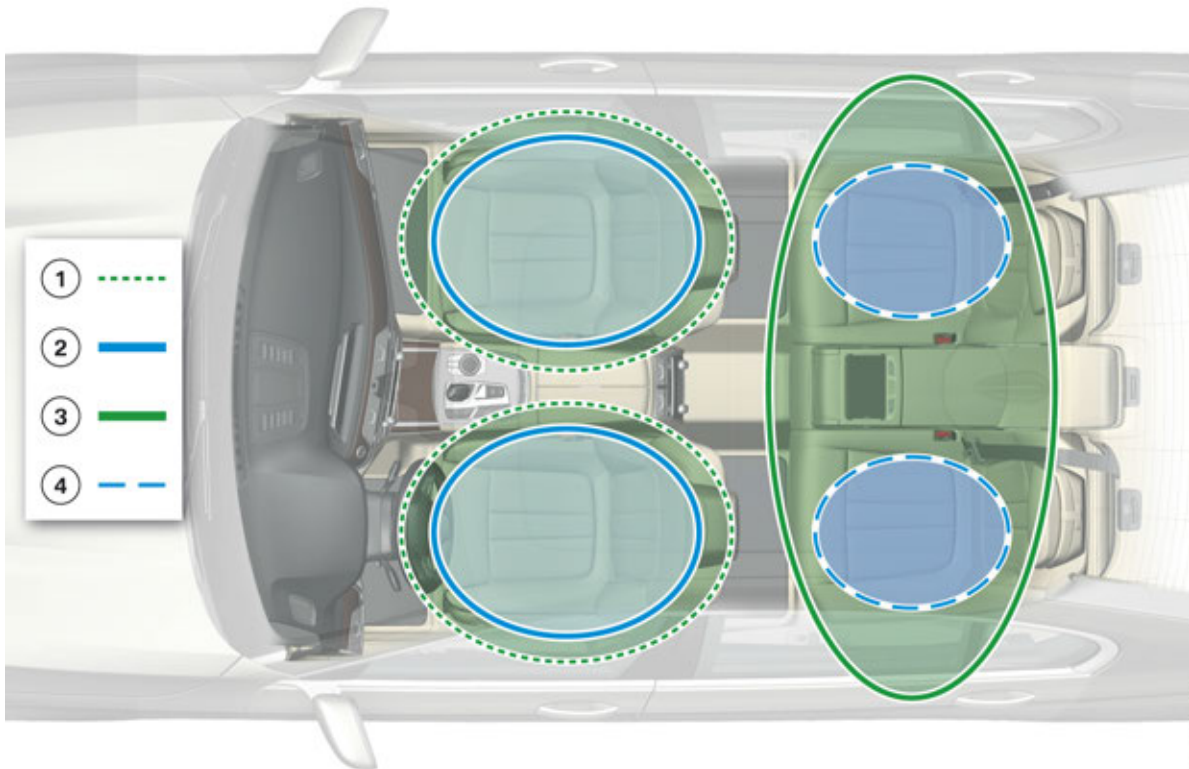
The 4-zone version of the integrated automatic heating/air conditioning system (IHKA) is installed in the G12. No other IHKA options are available at the start of production.

G12 Climate Control

1. Introduction

1.3.1. Zones

4-zone automatic heating/air conditioning



G12 4/3-zone IHKA – overview

Index	Explanation
1	Air flow control for driver/front passenger
2	Temperature adjustment for driver/front passenger
3	Air flow control for rear passenger compartment
4	Temperature adjustment for rear passenger compartment, left/right



G12 Climate Control

1. Introduction

1.3.2. Operating elements

The first digit represents the various temperature zones, in this case 4 different adjustment options for the entire vehicle interior. The digit 3 represents the various adjustment options for the amount of air, in this case 3 for the entire vehicle interior.

4-zone automatic heating/air conditioning

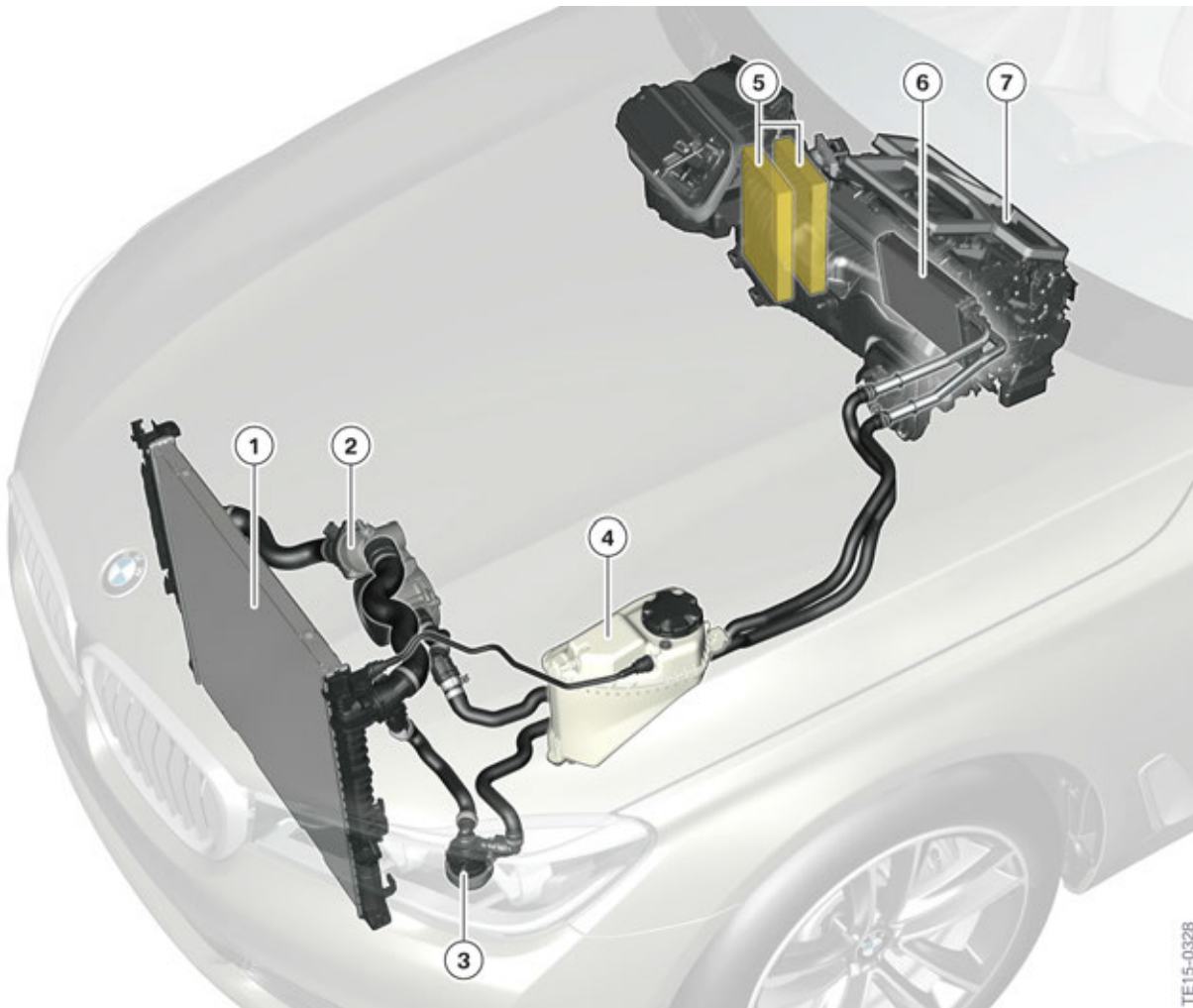
Temperature	front: left/right rear: left/right
Amount of air	front: left/right rear: jointly for left/right in center
Control panels for driver/front passenger	 G12 touch control panel
Control panels in rear passenger compartment	 G12 rear control panel

G12 Climate Control

2. Cooling Circuit

2.1. Overview

The engines coolant circuit is used to heat the vehicle interior. The lines are routed differently depending on the engine version. On all models the coolant lines together with the refrigerant lines are always routed on the left-hand side of the vehicle through the bulkhead into the vehicle interior.



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G12 coolant circuit

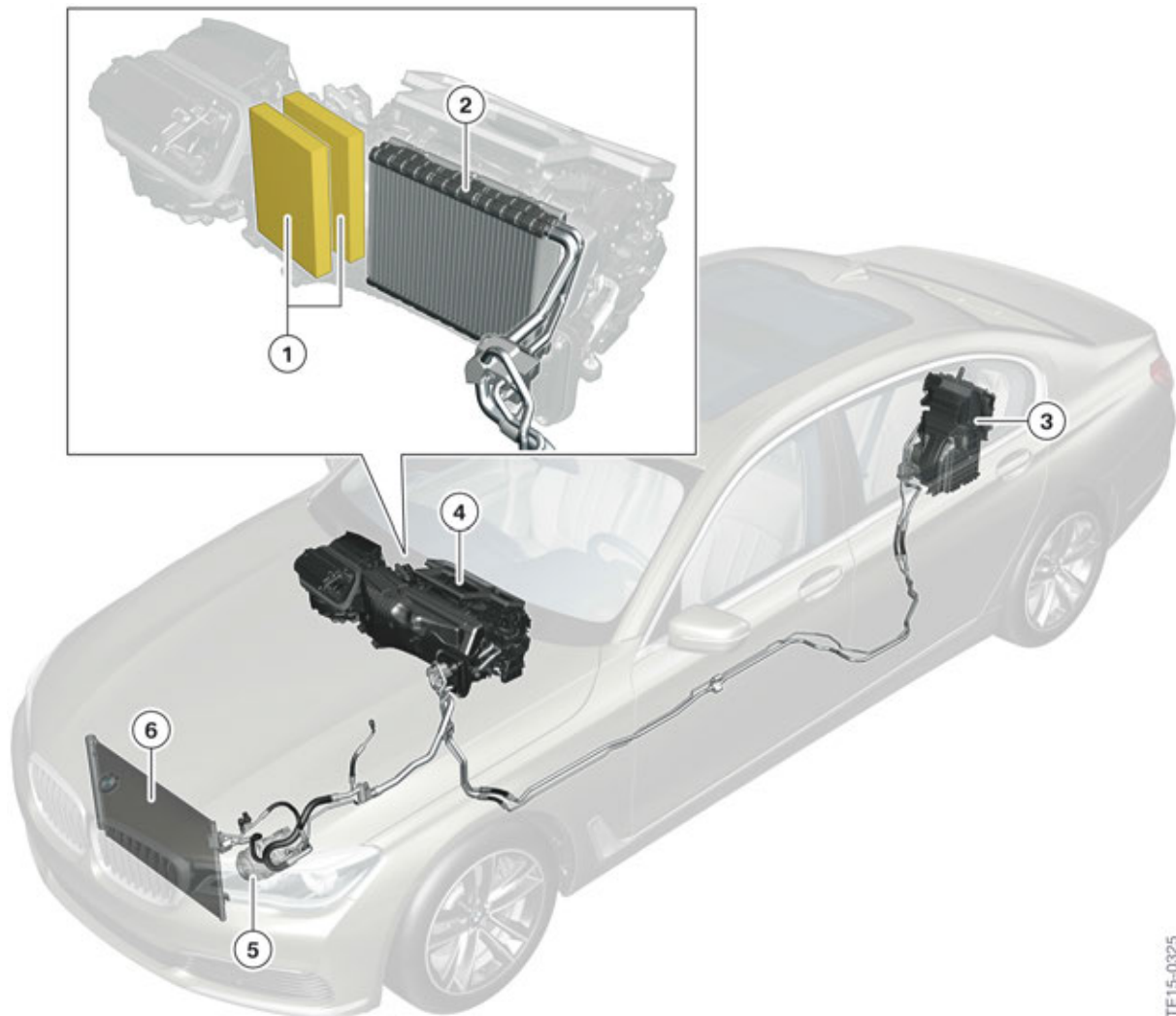
Index	Explanation
1	Radiator
2	Engine coolant pump
3	Electric coolant pump
4	Expansion tank
5	Micro filter
6	Heat exchanger
7	Heating and air-conditioning unit

G12 Climate Control

3. Refrigerant Circuit

3.1. Overview

The location of the refrigerant and coolant lines enters the passenger compartment on the left-hand side of the engine compartment.



G12 refrigerant circuit

Index	Explanation
1	Micro filter
2	Evaporator
3	Rear air-conditioner (Not for US)
4	Heating and air-conditioning unit
5	A/C compressor
6	Air conditioning condenser

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G12 Climate Control

3. Refrigerant Circuit

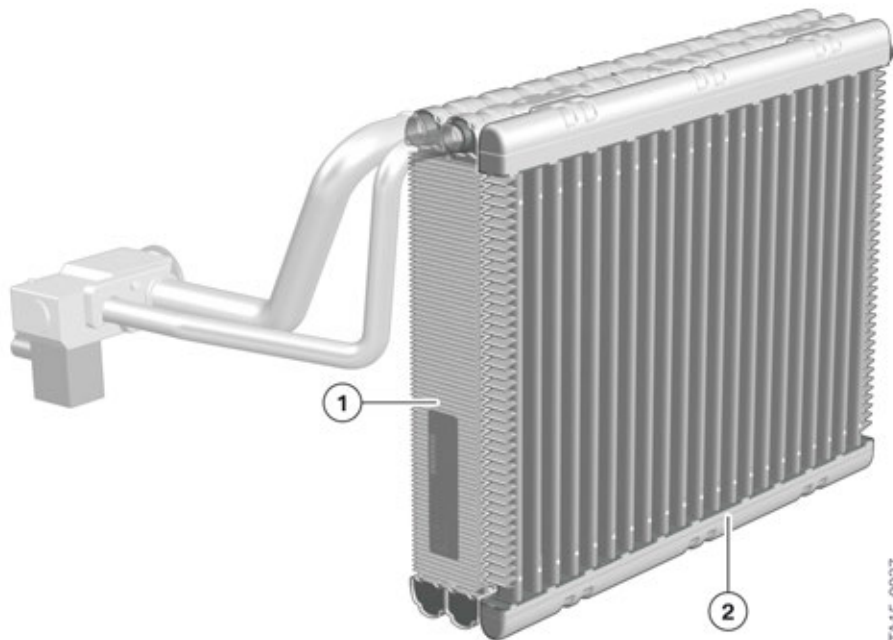
3.2. A/C compressor

The air conditioning compressor has been technically revised and its performance has been optimized.

3.3. Evaporator with Accumulator

The automatic engine start-stop function (MSA) can be used to switch off the engine. In this case, no refrigerant is delivered to the evaporator. As a result, only limited cooling capacity is available to cool the vehicle interior. If the vehicle is at a standstill for an extended period of time, the engine needs to be restarted in order to cool the interior. This counteracts the Efficient Dynamics measures and increases fuel consumption.

An accumulator evaporator is used. It is installed upstream of the air-conditioning evaporator and has the same concept as on the F10. The accumulator evaporator is filled with a latent substance that can absorb and store cooling energy very effectively. The cold air flowing past in normal operation charges the accumulator evaporator and can almost double its capacity.



G12 accumulator evaporator

Index	Explanation
1	Refrigerant evaporator
2	Accumulator evaporator

G12 Climate Control

3. Refrigerant Circuit

3.4. Refrigerant lines (inner heat exchanger – IWT)

A new component is being used in the G12 refrigerant circuit: the inner heat exchanger (IWT). This special pipe-in-pipe system uses the refrigerant exiting the evaporator (with a temperature of approx. 5° C / 41° F) to cool down the previously condensed refrigerant from the air conditioning condenser from approx. 55° C / 131° F to approx. 45° C / 113° F. This increases the evaporator performance and reduces the circulating flow of refrigerant with the same cooling power. As a result, the power consumption of the air conditioning compressor is reduced, which lowers fuel consumption.

The heat input into the refrigerant flowing to the compressor causes the refrigerant to completely evaporate. This prevents liquid refrigerant that is carried along from entering the air conditioning compressor.



G12 new refrigerant line

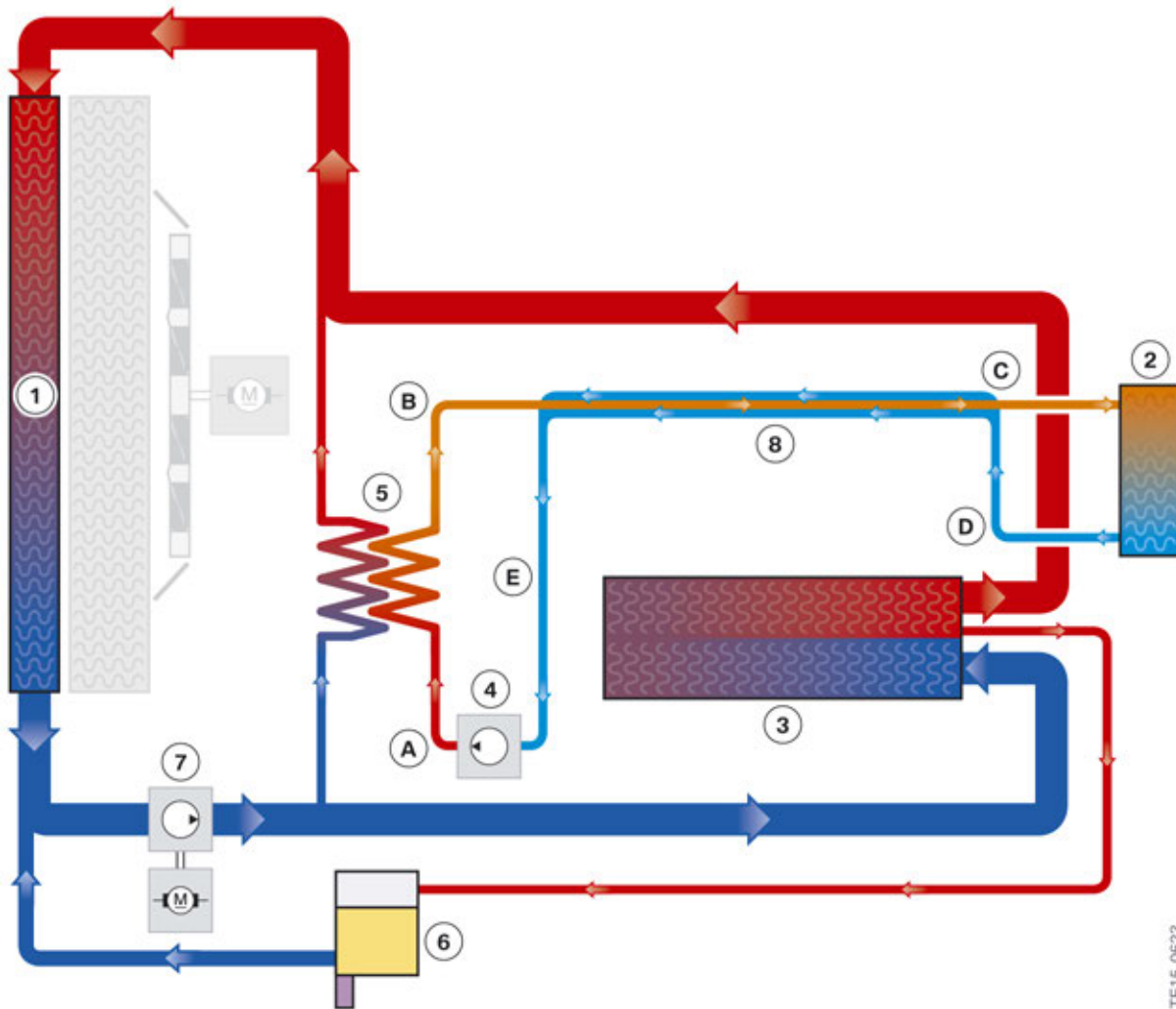
Index	Explanation
1	Intake pipe (return to air conditioning compressor)
2	Pressure line (feed to evaporator)

G12 Climate Control

3. Refrigerant Circuit

3.5. Coolant-cooled air conditioning condenser

For the G12 740i with the engine version B58, a coolant-cooled air conditioning condenser is being used for the first time. The previous air conditioning condenser in the radiator assembly is no longer used. The low-temperature circuit for the turbocharger intercooler is also used for the air conditioning condenser circuit (via a coolant/refrigerant heat exchanger). An electric coolant pump adjusts the requested cooling power from the air conditioning system and combustion engine.



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G12 low-temperature coolant circuit

Index	Explanation
1	Low temperature of radiator
2	Air conditioning evaporator
3	Indirect charge air cooler
4	A/C compressor
5	Coolant/refrigerant heat exchanger

G12 Climate Control

3. Refrigerant Circuit

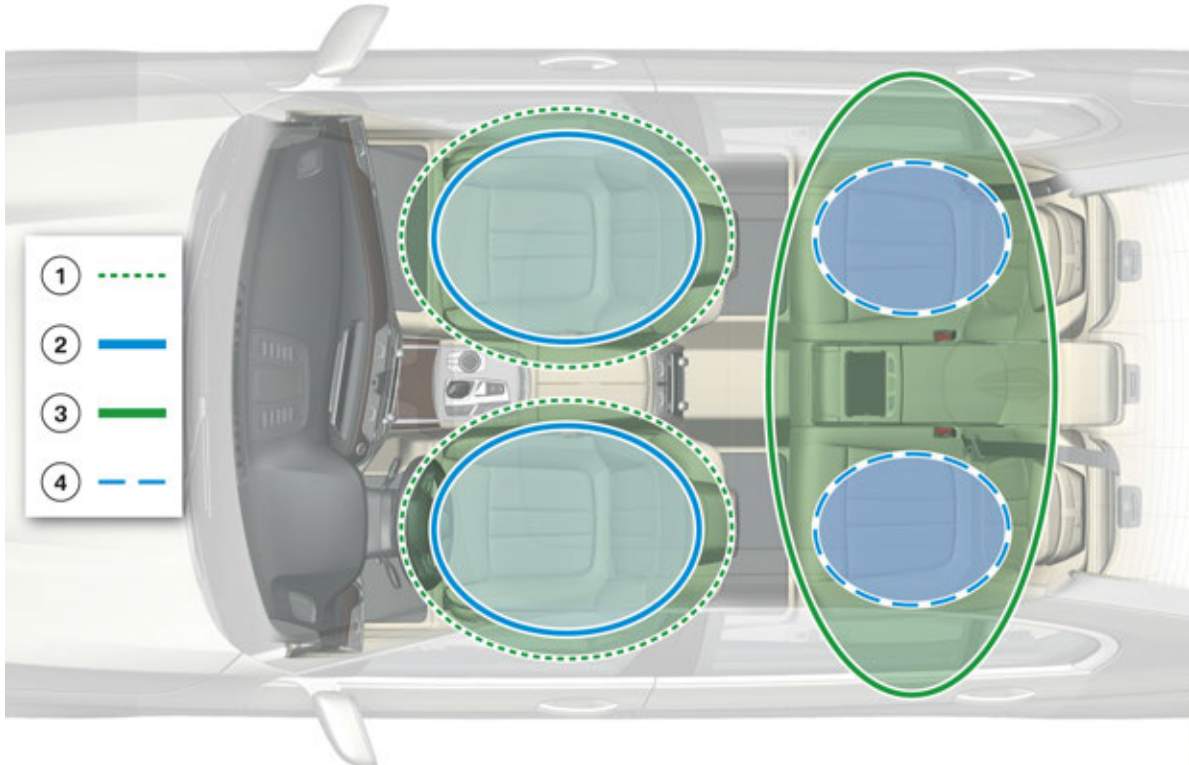
Index	Explanation
6	Expansion tank
7	Electric coolant pump
8	Inner heat exchanger (IWT)
A	Temperature of refrigerant upon entering heat exchanger/air conditioning condenser = + 80° C / 176° F
B	Temperature of refrigerant upon exiting heat exchanger/air conditioning condenser = + 55° C / 131° F
C	Temperature of refrigerant upon exiting inner heat exchanger (IWT) + 45° C / 113° F
D	Temperature of refrigerant upon exiting evaporator + 5° C / 41° F
E	Temperature of refrigerant upon exiting inner heat exchanger (IWT) + 15° C / 59° F

G12 Climate Control

4. Functions

4.1. 4-zone automatic heating/air conditioning

For the 4-zone IHKA, an additional control panel is installed in the rear passenger compartment. This gives the rear seat passengers the option of individual temperature control as well as joint control of the amount of air. The current settings of the driver can be transferred to the rear passenger compartment by pressing the "SYNC" button installed in the front IHKA control panel.



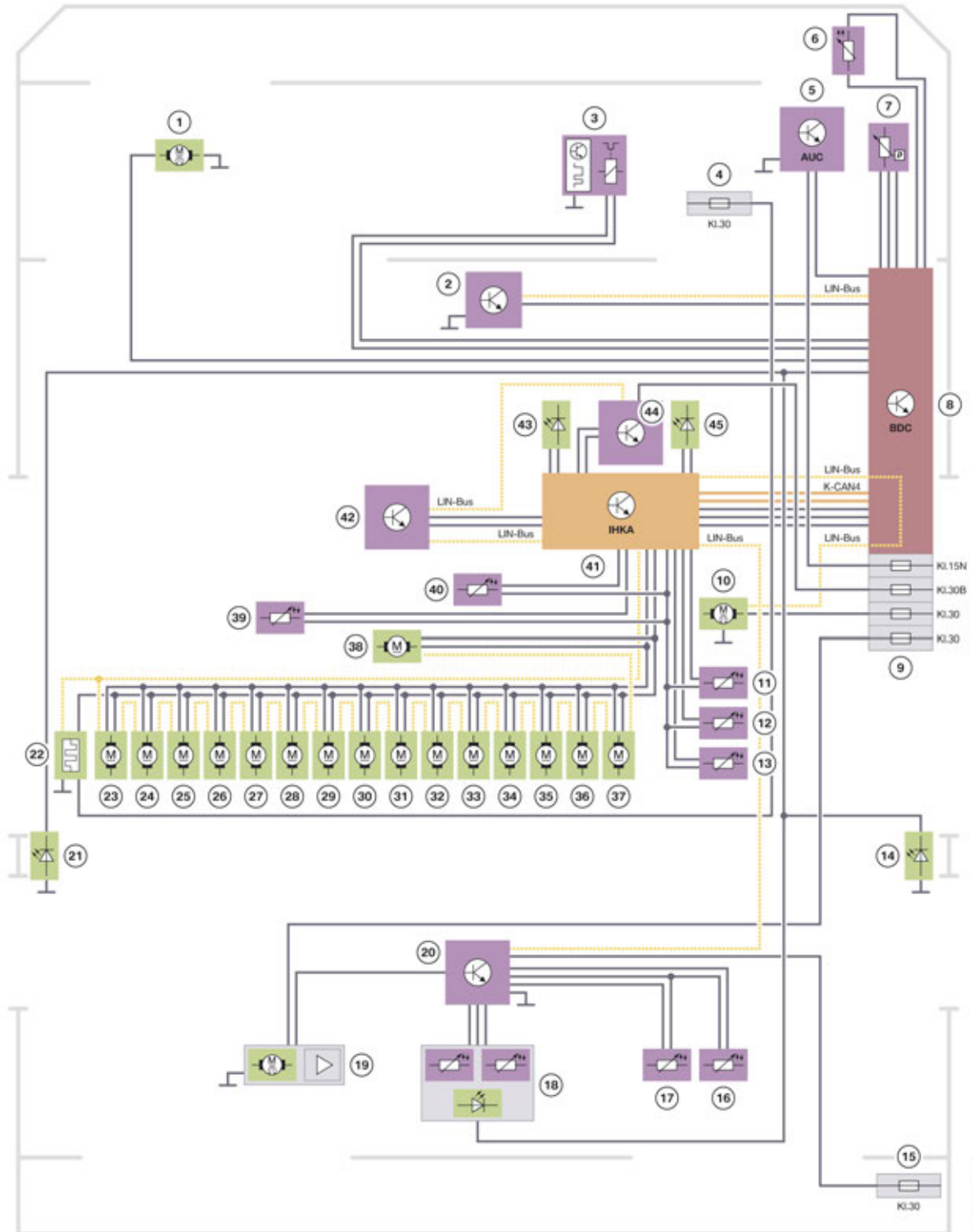
G12 4/3-zone – overview

Index	Explanation
1	Air flow control for driver/front passenger
2	Temperature adjustment for driver/front passenger
3	Air flow control for rear passenger compartment
4	Temperature adjustment for rear passenger compartment, left/right

G12 Climate Control

4. Functions

4.1.1. Wiring diagram



4/3-zone wiring diagram

TE15-0323

G12 Climate Control

4. Functions

Index	Explanation
1	Auxiliary Heating
2	Rain-light-solar-condensation sensor
3	Air conditioning compressor
4	Fuse in power distribution box, engine compartment
5	Automatic air recirculation control sensor
6	Outside temperature sensor
7	Refrigerant pressure sensor
8	Body Domain Controller (BDC)
9	Fuses in power distribution box, front right
10	Blower motor
11	Temperature sensor for evaporator
12	Temperature sensor for footwell, left
13	Temperature sensor for footwell, right
14	Lighting for fresh air grille for B-pillar, right
15	Fuse in power distribution box, rear right
16	Temperature sensor for footwell, rear right
17	Temperature sensor for footwell, rear left
18	Temperature sensor for rear passenger compartment, center fresh-air vent
19	Blower motor
20	IHKA control panel, rear passenger compartment
21	Lighting for fresh air grille for B-pillar, left
22	Electric auxiliary heater
23	Stepper motor for fresh air
24	Stepper motor for air recirculation function
25	Stepper motor, defrost
26	Stepper motor for ventilation, left
27	Stepper motor for ventilation, right
28	Stepper motor for stratification, left
39	Stepper motor for stratification, right
30	Stepper motor, footwell, left
31	Stepper motor, footwell, right
32	Stepper motor for air distribution in rear passenger compartment, left
33	Stepper motor for air distribution in rear passenger compartment, right
34	Stepper motor for blending flap in rear passenger compartment, left
35	Stepper motor for blending flap in rear passenger compartment, right

G12 Climate Control

4. Functions

Index	Explanation
36	Stepper motor for blending flap in rear passenger compartment, left
37	Stepper motor for blending flap in rear passenger compartment, right
38	Stepper motor for indirect ventilation
39	Temperature sensor for ventilation, left
40	Temperature sensor for ventilation, right
41	IHKA control unit
42	IHKA control panel for driver/front passenger
43	Lighting for knurled wheel, ventilation outlet
44	Stratification controller with touch operation
45	Lighting for knurled wheel, ventilation outlet

4.1.2. 4-zone IHKA control panel

The 4-zone IHKA operating concept features a full-color display IHKA. The bottom of the display between the two temperature selector wheels now features a touch panel for the first time. The amount of air for the driver/front passenger as well as the seat heating/active seat ventilation and the air freshener can be adjusted using touch control. To do so, users must touch the symbol on the display. As soon as the touch panel detects that a user has touched the screen, an information page appears on the central information display (CID) with information about the desired setting for the operator. This page disappears automatically after a few seconds.

On the 4-zone IHKA, the current settings of the driver for temperature, amount of air and air distribution can be transferred to the passenger's side and the rear passenger compartment by pressing the SYNC button.



G12 4-zone IHKA control panel with touch operation

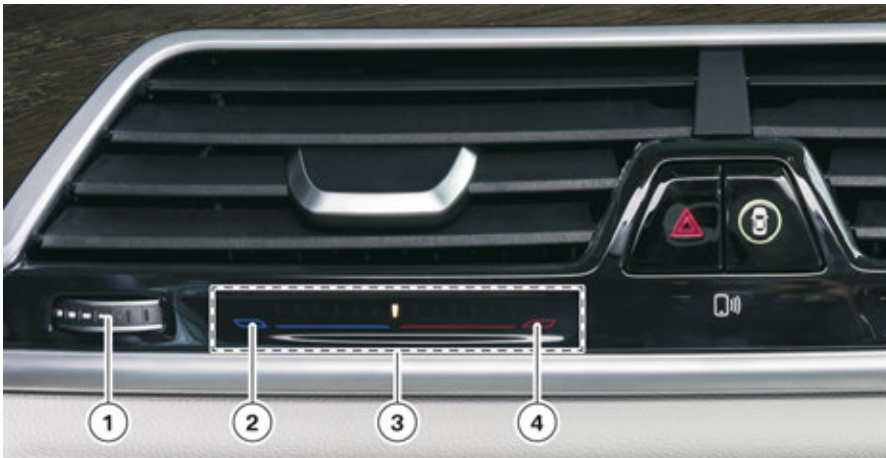
Index	Explanation
1	Touch-sensitive surface (touch panel)

G12 Climate Control

4. Functions

4.1.3. Layering

In conjunction with the 4-zone IHKA, a touch-sensitive touch panel for adjusting the stratification has been installed for the first time underneath the center vent for the temperature stratification (separate for the driver/front passenger). To adjust, users can slide their finger or touch the panel at the desired position. The index then jumps directly to the position that the user has touched. The third option is to touch the respective end position (blue or red). The index then jumps one level in the respective direction. As soon as the system detects that a user has touched the panel, this is shown accordingly on the central information display (CID).



G12 touch stratification

Index	Explanation
1	Rotary controller for opening/closing the center vent – driver
2	Cold stratification range
3	Touch-sensitive surface (touch panel)
4	Warm stratification range

G12 Climate Control

4. Functions

4.1.4. 4-zone IHKA control panel for rear passenger compartment

In addition, the 4-zone IHKA has a control panel in the rear passenger compartment. The rear passengers can separately adjust the temperature on the left and right. The air distribution and the amount of air flow is combined and not adjusted separately for the left and right rear passenger compartment.

On the 4-zone IHKA, the current settings of the driver for temperature, amount of air and air distribution can be transferred to the passenger's side and the rear passenger compartment by pressing the SYNC button.



G12 4-zone IHKA control panel for rear passenger compartment

G12 Climate Control

4. Functions

4.1.5. Touch Command

The new Touch Command operating element (optional equipment 6U9) is being used in the G12 for the first time. The removable tablet PC not only replaces the rear passenger compartment iDrive controller, it also provides additional functions. All settings and functions of the IHKA control panel for the rear passenger compartment can also be configured/activated with the Touch Command. Further information on Touch Command can be found in the Training Reference Manual "G12 Display and Operating Elements".



G12 Touch Command

4.1.6. Air treatment

Air freshener

The Ambient Air Package optional equipment (OE 4NM) includes an air freshener and an ionizer. The air freshener enhances the vehicle interior with one of 4 selectable fragrances, each of which is available in 2 intensity levels. 2 of these 4 selectable cartridges can be placed together in a small extendable storage compartment in the glove box on the passenger's side. Customers can then decide between one of the two fragrances provided. It is only possible to select the available fragrance cartridges on the central information display (CID) using the iDrive controller. An intensity level from 1 to 3 can be selected by the menu on the central information display (CID) or using the button on the air conditioning control panel. If the user activates the air freshener the information window automatically appears on the central information display (CID). It is not possible to mix the two fragrances.

G12 Climate Control

4. Functions

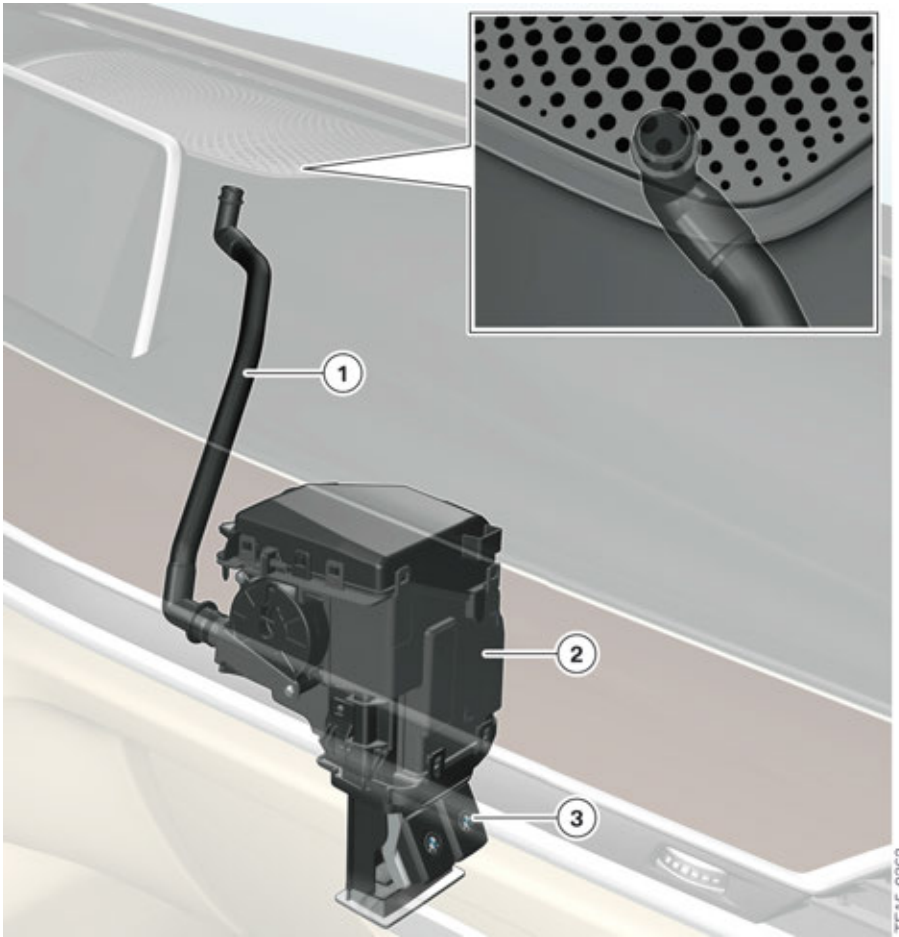


G12 air freshener graphic on CID

The selected fragrance enhances the vehicle interior in pulses at defined intervals according to the configured intensity level. This is because a person's sense of smell adjusts to a given scent relatively quickly and then no longer perceives it. When stepping into the vehicle, a "welcome scenario" is activated depending on the settings of the personalized ignition key (Key Memory). Depending on the setting for the intensity level, a separate fan installed in the air freshener unit then directs air through the cartridge every 90 s – 5 min, which is supplied to the vehicle interior. The enhanced air is only directed into the vehicle interior at one central point at the top of the instrument panel. To facilitate this, it must be ensured that the vehicle interior is indirectly ventilated. If the air freshener is deactivated on the central information display (CID), the integrated fan in the air freshener unit continues running for approx. 30 s to purge the system.

G12 Climate Control

4. Functions



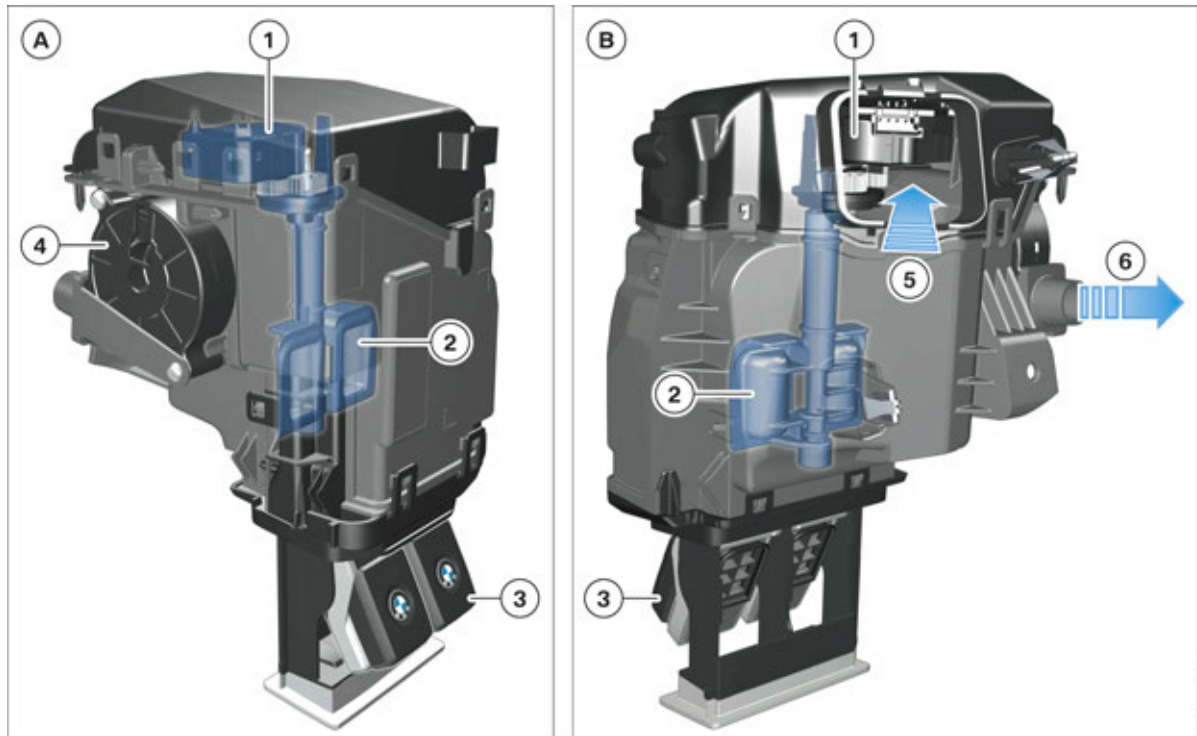
G12 air freshener unit on left-hand drive vehicles

Index	Explanation
1	Air line from the air freshener unit to the air vent in the dash panel
2	Air freshener unit
3	Fragrance cartridge

The air freshener unit is installed in the glove box on the passenger's side.

G12 Climate Control

4. Functions

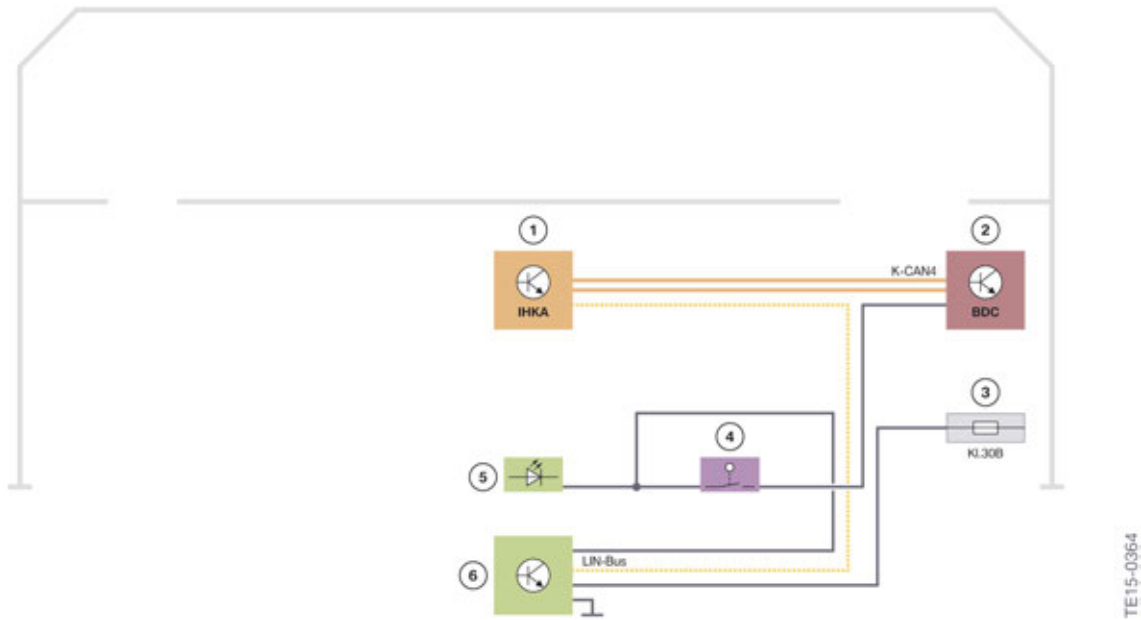


G12 air freshener unit with 2 cartridges on left-hand drive vehicle

Index	Explanation
A	Air freshener unit – view from vehicle interior
B	Air freshener unit – view from engine compartment
1	Servomotor for controlling the air flaps for the various fragrances
2	Air flaps
3	Fragrance cartridges
4	Blower of air freshener unit
5	Air intake opening
6	Air outlet opening for the scented air

G12 Climate Control

4. Functions



G12 air freshener wiring diagram

Index	Explanation
1	IHKA control unit
2	Body Domain Controller
3	Fuse in power distribution box, front right
4	Glove box switch
5	Glove box light
6	Air freshener control unit

G12 Climate Control

4. Functions

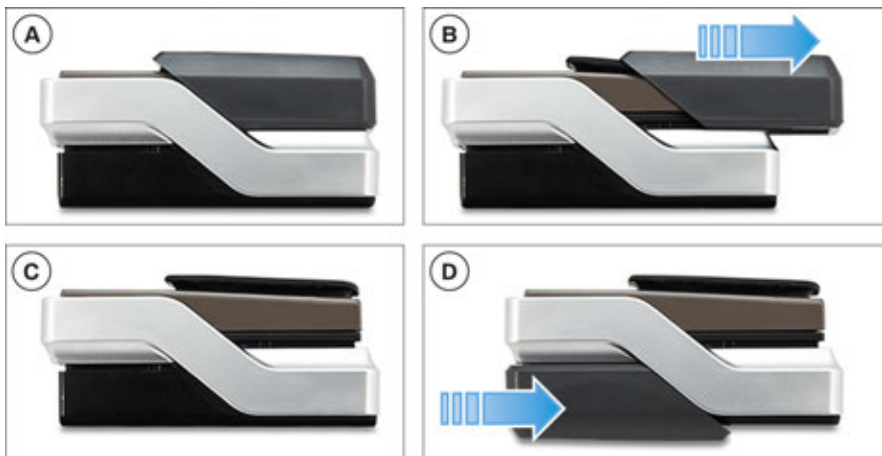
Fragrance cartridge



TK15-0365

G12 fragrance cartridge

The fragrance cartridges manufactured by Mahle are available from BMW Parts and have a shelf life of up to 2.5 years. With average consumption the cartridges will last approx. 3–6 months before they need to be replaced. Empty fragrance cartridges can be disposed of with household waste. Every cartridge is equipped with a SIM card that provides information on the fragrance, filling level and age of the cartridge by the LIN-bus. The lid on the cartridge, which seals the cartridge using a rubber seal on the housing, prevents the fragrance from escaping while the cartridge is in storage. The cartridge lid is pushed on and needs to be removed before inserting the cartridge into the air freshener unit. The lid can be slid back on to the rear side of the cartridge, but this is not required to insert the cartridge into the air freshener unit, its only for storing the lid for future use.



TE15-0366

Handling the cartridge lid

G12 Climate Control

4. Functions

Index	Explanation
A	Closed cartridge
B	Opening the cartridge closure
C	Cartridge opened
D	Cartridge lid slid on to the cartridge base

Fragrance versions

The following list provides an overview of the available fragrances and whether they are mild or strong. The fragrances labelled with No. 1 are milder than those labelled with No. 2. Each vehicle with the relevant Air Package equipment (optional equipment 4NM) is supplied with a starter kit of 4 fragrances.

The following fragrances are available in No.1 (mild) or No. 2 (rich):

- Blue Suite 1 light
- Green Suite 1 light
- Golden Suite 2 rich
- Authentic Suite 2 rich

Ionizer

The ionizer in the G12 has little in common with the system from the F01/F02. The ionizer installed in the F01/F02 only functions if there are no occupants in the vehicle and the vehicle is locked. The new system in the G12 always functions when the vehicle is in use and the system is not switched off on the central information display (CID).

The ionizer is responsible for bringing negatively charged air ions into the vehicle interior. The aim is to eliminate pathogenic microorganisms in the air, such as germs and allergens. Dirt particles in the air flowing past become heavier as a result of the adhesion of the negative ions and the bonding into a molecule, and sink to the bottom.

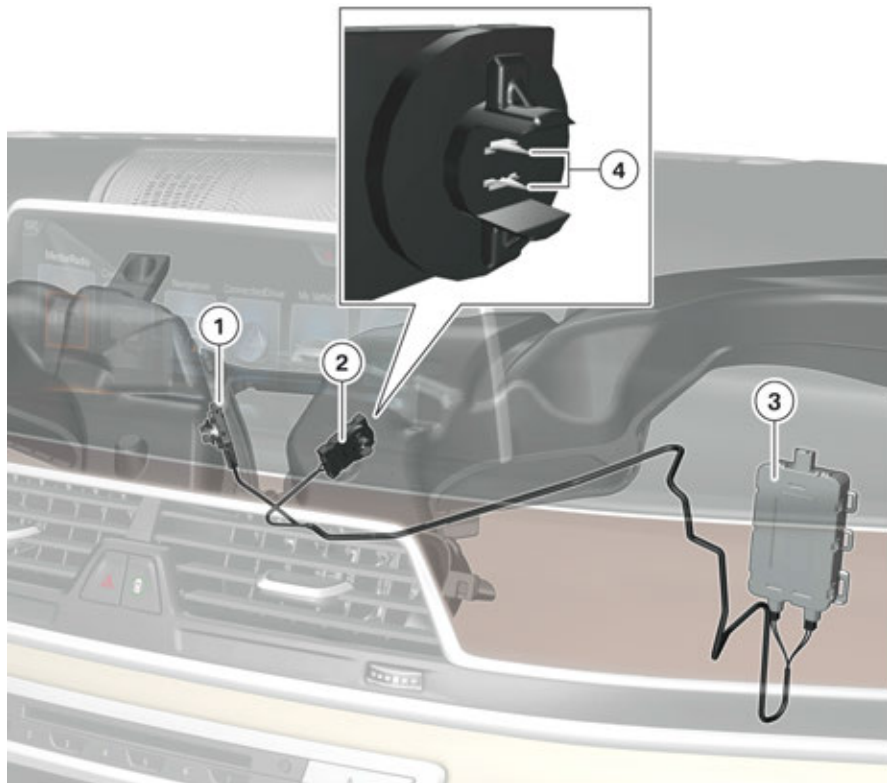


G12 ionizer

The emitters that are installed in the air ducts of the central vents are operated using a high-voltage discharge of approx. 2000–3000 V. However, the current applied for this lies within the microampere range of 0.53 μA and is therefore non-hazardous. Only negatively charged air ions are generated as a result of the air flowing past the emitters. These can bind more oxygen, which contributes to an improved sense of wellbeing and higher concentration.

G12 Climate Control

4. Functions



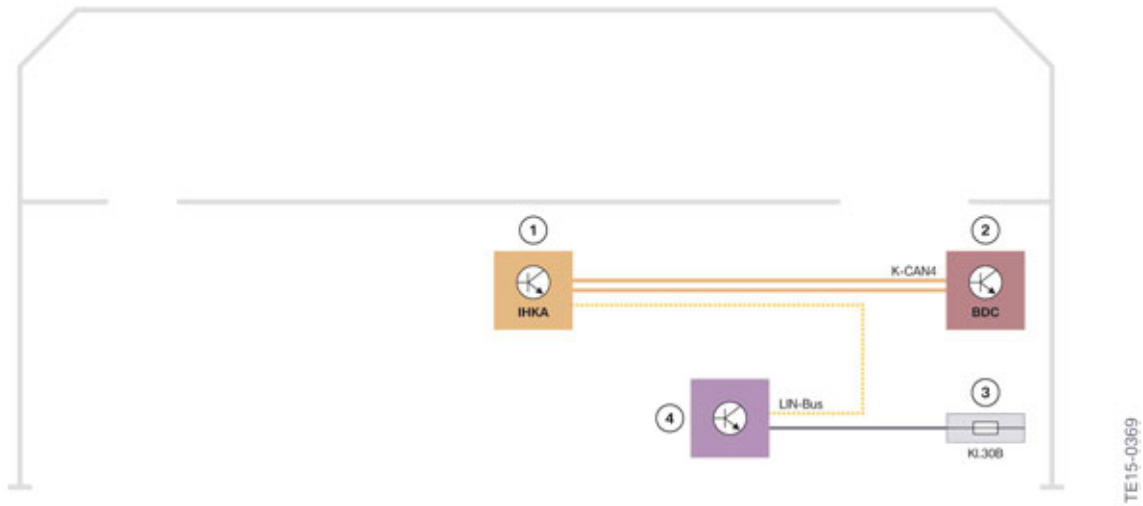
G12 emitters

Index	Explanation
1	Emitter on driver's side
2	Emitter on passenger's side
3	Ionizer control unit
4	Emitters

The ionizer control unit is installed on the heating and air-conditioning unit near the IHKA control unit. 3 electrical connections are provided on the control unit. One three-pin connection is responsible for LIN-bus communication and the supply voltage. The other two connections are two-pin and supply the necessary high voltage to the emitters in the air ducts. The main control unit that controls the ionizer is the IHKA. The system has diagnostic capability and runs a self-test when starting by applying high voltage to the emitters. If the system fails to apply high voltage to the emitters three times, the system switches off and a fault message appears on the central information display (CID).

G12 Climate Control

4. Functions



G12 ionizer wiring diagram

Index	Explanation
1	IHKA control unit
2	Body Domain Controller (BDC)
3	Fuse in power distribution box, front right
4	Ionizer control unit



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